ATMOSPHERE/ENERGY UNDERGRADUATE MAJOR

Requirements

Mathematics and Science (45 units minimum):

Mathematics

23 units minimum, including at least one course from each group:

Group A

- MATH 53: Ordinary Differential Equations with Linear Algebra
- CME 102: Ordinary Differential Equations for Engineers

Group B

- CME 106: Introduction to Probability and Statistics for Engineers
- STATS 60: Introduction to Statistical Methods: Precalculus
- STATS 101: Data Science 101
- STATS 110: Statistical Methods in Engineering and the Physical Sciences

Science

20 units minimum, including all of the following:

- PHYSICS 41 or PHYSICS 41E: Mechanics, Concepts, Calculations, and Context
- PHYSICS 43 or PHYSICS 45: Electricity and Magnetism or Light and Heat
- CHEM 31B or CHEM 31X: Chemical Principles II or Chemical Principles Accelerated
- CEE 70: Environmental Science and Technology

Technology in Society (1 course)

One 3-5 unit course required; must be on School of Engineering Approved List the year taken.

Writing in the Major (WIM)

One 3-5 unit course required. Choose a TiS course that fulfills a WIM:

- BIOE 131: Ethics in Bioengineering
- COMM 120W: Digital Media in Society
- CEE 100: Managing Sustainable Building Projects
- EARTHSYS 200: Environmental Communication in Action: The SAGE Project

Fundamentals and Depth: At least 40 units total must be from the School of Engineering

Engineering Fundamentals

Two courses minimum (recommend 3), including at least one of the following:

- ENGR 25E: Energy: Chemical Transformations for Production, Storage, and Use
- ENGR 50E: Introduction to Materials Science, Energy Emphasis

Plus at least one of the following:

- ENGR 10: Introduction to Engineering Analysis
- ENGR 70A: Programming Methodology

A third Fundamental is optional but recommended (3-4 units)

Engineering Depth

Required: 6-8 units, Introductory seminars may not count toward Engineering Depth

- CEE 64: Air Pollution and Global Warming: History, Science, and Solutions (cannot also fulfill science requirement)
- CEE 107A: Understanding Energy
- CEE 107S: Understanding Energy - Essentials

34-36 units from the following with at least four courses from each group; at least 40 of the units in ENGR Fundamentals and Depth must be from the School of Engineering:

Group A: Atmosphere

- AA 100: Introduction to Aeronautics and Astronautics
- CEE 63: Weather and Storms
- CEE 101B or ME 70: Introductory Fluids Engineering
- CEE 161C: Natural Ventilation of Buildings
- CEE 161I: Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation
- CEE 162I: Atmosphere, Ocean, and Climate Dynamics: The Ocean Circulation
- CEE 172: Air Quality Management
- CEE 178: Introduction to Human Exposure Analysis
- EARTHSYS 111: Biology and Global Change
- EARTHSYS 142: Remote Sensing of Land
- EARTHSYS 144: Fundamentals of Geographic Information Science (GIS)
- EARTHSYS 188: Social and Environmental Tradeoffs in Climate Decision-Making
- ME 131B: Fluid Mechanics: Compressible Flow and Turbomachinery
- PHYSICS 199: The Physics of Energy and Climate Change
- EARTH 2: Climate and Society
- EARTHSYS 196: Implementing Climate Solutions at Scale

Group B: Energy

- CEE 156: Building Systems
CEE 173S  
Electricity Economics

CEE 176A  
Energy Efficient Buildings

CEE 176B  
100% Clean, Renewable Energy and Storage for Everything

CEE 177S  
Engineering and Sustainable Development

EARTHSYS 101  
Energy and the Environment

EARTHSYS 102  
Fundamentals of Renewable Power

ENERGY 104  
Sustainable Energy for 9 Billion

ENGR 50E  
Introduction to Materials Science, Energy Emphasis

MATSCI 144  
Thermodynamic Evaluation of Green Energy Technologies

MATSCI 156  
Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution

ME 182  
Electric Transportation

POLISCI 73  
Energy Policy in California and the West

OSPSANTG 29  
Sustainable Cities: Comparative Transportation Systems in Latin America

OSPSANTG 52  

Total Units 95-101

1. Can count as a science requirement or Engineering Fundamental, but not both.
2. CEE 64 can count as a science requirement or as Engineering Depth, but not both.
3. ENGR 50E can count as Engineering Fundamental or Engineering Depth, but not both.
4. A course may only be counted towards one requirement; it may not be double-counted. All courses taken for the major must be taken for a letter grade if that option is offered by the instructor. Minimum Combined GPA for all courses in Engineering Fundamentals and Depth is 2.0.
5. Courses outside of the School of Engineering (SoE) do not count toward the 40 units of engineering coursework required in the Fundamentals plus Depth categories.

Honors Program

The A/E honors program offers eligible students the opportunity to engage in guided original research, or project design, over the course of an academic year. Interested student must adhere to the following requirements:

1. Prospective honors students write up and submit a 1-2 page letter applying to the honors program in A/E describing the problem to be investigated. The letter must be signed by the student, the current primary adviser, and the proposed honors adviser, if different, and submitted to the student services office in the Department of Civil and Environmental Engineering (CEE). The application must include an unofficial Stanford transcript. Applications must be received in the fourth quarter prior to graduation. It is strongly suggested that prospective honors students meet with the proposed honors adviser well in advance of submitting an application.

2. Students must maintain a GPA of at least 3.5.

3. Students must complete an honors thesis or project over a period of three quarters. The typical length of the written report is 15-20 pages. The deadline for submission of the report is to be decided by the honors adviser, but should be no later than the end of the third week in May.

4. The report must be read and evaluated by the student's honors adviser and one other reader. It is the student's responsibility to find and obtain both the adviser and the reader. At least one of the two must be a member of the Academic Council in the School of Engineering.

5. Students must present the completed work in an appropriate forum, e.g. in the same session as honors theses are presented in the department of the adviser. All honors programs require some public presentation of the thesis or project.

6. Students may take up to 10 units of CEE 199H Undergraduate Honors Thesis (optional). However, students must take ENGR 202S Directed Writing Projects or its equivalent (required). Units for the writing class are beyond those required for the A/E major.

7. Two copies of the signed thesis must be provided to the CEE student services office no later than two weeks before the end of the student's graduation quarter.

For additional information and sample programs, see the Handbook for Undergraduate Engineering Programs (UGHB) (http://ughb.stanford.edu).